Time to Compile: Compliance Between Artistic Inquiry and Research Questions

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***Abstract*— Societies often make sense about the world around them through art; art made in the context of its subject matter can bring a technically-informed sense-making that is important for a society informed about robots. This extended abstract outlines the themes and atmospheres of an artistic piece, *Time to Compile*, that resulted from a collaboration between an independent artist and a robotics lab. The paper will address the support an artistic piece provides robotics researchers and the societal relevance and timeliness of technically-informed art about robots.**

I. Introduction

Imagine for a moment that you are staring at a screen in your home, Skyping a friend. A bleak but dynamic light illuminates your face in the dark room. Shadows fall across your friend's face from light sources you cannot see in a room you may have never visited. Yet, here you are, "seeing" them and communicating, sharing liveness with a body whose environment is foreign to yours except for the shared view of a pixelated border, painted by engineers with opaque tools, the designers of the Skype application.

Sonic and visual data is pinging servers thousands of miles away before reaching you and your friend, who may also be thousands of miles away from each other, to facilitate this interaction. Consider the rooms upon rooms where this same phenomena are occurring. These "rooms" are simultaneously connected and yet physically separated. These rooms have a synchrony facilitated by realtime communication and yet contain many features of human intent from years prior. These dislocations in space and time create a uniquely contemporary phenomenon, the mechanism of which is invisible to the human eye.

This ambiguous space – between physical experience, communication, and mechanistic truths – is a point of exploration that is even further complicated by embodied agents moving in our environment. How do we negotiate these new abstractions of ourselves? Outside of binary, outside of question/answer, outside of borders. What is our fascination with exporting consciousness? Why do we create machines out of our own physical image? Can we translate these questions into a live performance?

Time to Compile, a collaborative artistic piece, comprised of both live performance and interactive installation elements, considers these themes of space, time, and identity through the lens of robotics and dance. This piece is inspired by prior work in this space [1], [2], [3], [4], [5], [6].

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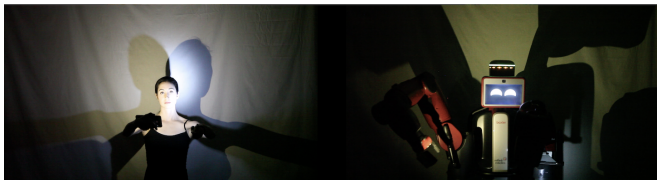
II. Creative Compliance Via Intersecting Goals

Humans are curious and misinformed about robots [7], [8]. Popular media often incites a fear that robots are economically and intellectually superior to humans. The co-artistic and research goals of Time to Compile are therefore to provide the public with an intimate, live, and educational experience, with typically inaccessible robotic technology, through an engaging and nuanced performance. This results in questions of human identity pertaining to technology and reconsideration of personal assumptions about technology.

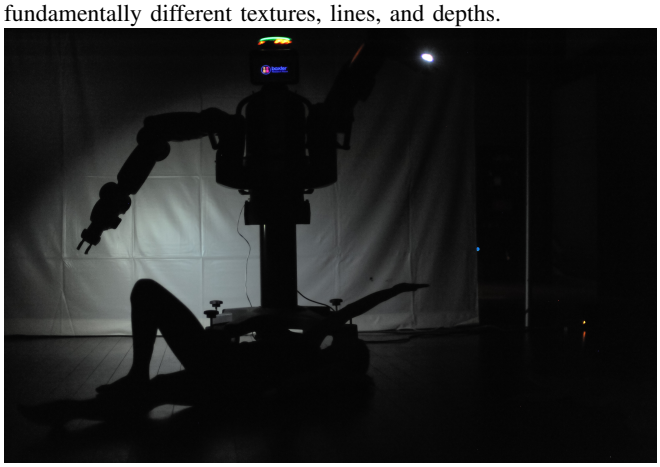
To understand how these opinions about robots have been formed, researchers need to be able to create as rich and engaging experiences with robots as media, science fiction, and culture already have. This means that the typical robotics lab, with harsh fluorescent lighting and bleak walls, needs some theatrical upgrades. Moreover, there is an inherent overlap between a central driving goal of an artist: to create an experience in an audience member, and a researcher: to measure experience of human subjects. With these goals as our media, we'll explicate how their compliance has resulted in a new artistic work that leverages user studies to create and measure an experience for audience members.

Time to Compile was created in response to three lines of artistic and scientific inquiry: 1) The Hidden Human Network. Many technologies are powered by humans for the benefit of each other, but often this network is occluded, leaving a machine seeming quite intelligent, e.g., IBMs Watson, which is powered by the webpage postings of users all over the Internet. 2) Are humans becoming more robot-like? This question was originally posed in the reverse, but upon further inspection, it is easy to argue that the rich adaptability of humans is heavily exploited in emerging technologies (more than any particularly successful imitation of biology). With these changes, are humans finding social structures like family or friendships in embodied and personal technology experiences? 3) Time to Compile. How long does it take to find resolution with or understanding of different technologies? How long before we iterate on the first design and find a second? Who gets to investigate the inner- workings of these machines before? When have we assimilated a new technology permanently? How will we change?

Towards these ends, one initial research goal was understanding how the public (or on a small scale, audiences) thinks of robots, and specifically those robot agents that appear in the performance. An experimental tested was thus created inside of a live performance to present these



(a) The human performer at left is contrasted with the Baxter robot at right. Both agents are lit in similar modes, yet possess fundamentally different textures, lines, and depths.



(b) The robot and the human performer are obfuscated to reflect the hidden networks driving technology as well as alter the dimensionality of the movement of each. Credit Keira Heu-Jwyn Chang for *Time to Compile*.

(c) The audience participant was instructed to follow the motion of the robot in the shadow. Credit Sam Berube for *Time to Compile*.

Fig. 1: Images from *Time to Compile*.

inquiries. This testbed for human-robot interaction relies on creativity narrative, live performance, and synergistic art-making to power the research process.

III. The Piece

Time to Compile is subdivided into a staged performance piece and an interactive embodied artistic installation. The mood of the piece is distant and remote yet sparkly and intriguing. We use soft elements (both live and pre-recorded) like sheets, skin, and sex to contrast the hard lines of robots, virtual avatars, and transistors.

The staged performance piece is referred to as "the system", in some cases the performance begins with an announcement "you are now in the system". The piece progresses with a hypnotic and magical quality, priming the audience for a specific kind of interaction with robotic technology. The moving bodies of humans and robots are lit and magnified in various ways, creating interplay between scale, shape, form, and motion. Performing agents are frequently obfuscated, mirroring the obfuscation of technology and human to human communication mediated by technology. The sound varies from speaking to digitally influenced musicians. The videos frequently edit between perspectives, adding textural dimensions at different sizes and distances. Audience members view the human performers with varying positive/negative relationships to the robot agents, sparking questions of power, acceptability, and valence.

Audience members are invited to "enter the system" in the interactive installation. Participants engage in designed tasks with different technologies (avatars, robots, their own cellphones) at each station before drawing their understanding of the experience. Participants' interactions oscillate between simple to frustrating, simulating the feelings of alienation and satisfaction we often experience with machine and computer interfaces. The overall tone is safe, exploratory, and suspended. Audience members often express that the interactive installation feels like a journey. This experience allows them to consider internal questions about their own relationships to technology.

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